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(54) **BALANCED HEAT EXCHANGER SYSTEMS AND METHODS**

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(57) **ABSTRACT**

A heat exchanger is provided having a first fluid circuit defining a first volume and configured to permit a first fluid to flow therethrough with a first fluid supply. The heat exchanger includes a second fluid circuit defining a second volume separate from the first volume and sharing at least one common wall with the first enclosed volume, and configured to permit a second fluid to flow therethrough from a second fluid supply. One or more thermal transfer sheets having one or more channels therein are configured in structural and thermal contact with both the first and second fluid circuits, the channels having a thermodynamic fluid disposed therein and configured to transfer heat between the first fluid circuit and the second fluid circuit. A thermal transfer rate through the at least one common wall is less than a thermal transfer rate of the one or more thermal transfer sheets.

**10 Claims, 4 Drawing Sheets**

